

II. WATER RESOURCES AND SYSTEM OVERVIEW

PRECIPITATION AND EVAPORATION

The average annual precipitation in the LWC Planning Area is approximately 53 inches. Nearly two-thirds of the rainfall occurs during the six-month wet season from May through October. Much of this rainfall is returned to the atmosphere by plant transpiration or evaporation from soils and water surfaces. Hydrologic and meteorologic methods are available to measure and/or estimate the combined rate at which water is returned to the atmosphere by transpiration and evaporation. The combined processes are known as evapotranspiration (ET). ET, like rainfall, is generally expressed in inches per year. Approximately 45 inches of water per year is returned to the atmosphere by evapotranspiration in South Florida. The excess of average precipitation over average ET is equal to the combined amounts of average surface water runoff and average ground water recharge. A detailed description of rainfall in the LWC Planning Area is provided in Appendix C.

SURFACE WATER RESOURCES

Lakes, Rivers, and Canals

Surface water bodies in the LWC Planning Area include lakes, rivers, and canals which provide storage and conveyance of surface water. Lake Trafford and Lake Hicpochee are the two largest lakes within the planning area, but neither lake is considered a good source of water supply. Plate 1, in the back of this document, shows the lakes, rivers and canals of the 10 drainage basins (see below) in the LWC Planning Area.

The Caloosahatchee River is the most important source of surface water in the region and extends across seven of the ten drainage basins in the planning area. The river is supplied by inflows from Lake Okeechobee and runoff from within its own basin. The freshwater portion of the river (C-43) extends eastward from the Franklin Lock and Dam (S-79) towards Lake Okeechobee and the cities of La Belle and Moore Haven. West of S-79, the river mixes freely with estuarine water as it empties into the Gulf of Mexico.

The remaining rivers and canals in the LWC Planning Area drain either into the Caloosahatchee River or the Gulf of Mexico. The majority of canals were constructed as surface water drainage systems rather than for water supply purposes. The C-43 Canal is the only major canal used for water supply and it is maintained by releases from Lake Okeechobee.

Drainage Basins

The planning area is divided into 10 major drainage basins according to their respective hydrologic characteristics (Plate 1). These basins are the (1) North Coastal Basin, (2) Tidal Caloosahatchee Basin, (3) Telegraph Swamp Basin, (4) West Caloosahatchee Basin, (5) East Caloosahatchee Basin, (6) C-21 Basin, (7) S-236 Basin, (8) Estero Bay Basin, (9) West Collier Basin, and (10) East Collier Basin. The West Collier and East Collier basins have extensive wetland systems, which are described in Chapter III of this document.

Lower West Coast Background Document

This section focuses on the major lakes, rivers, and canals of the drainage basins as they relate to water supply. Some of these basins have surface water bodies with regional water supply potential. Those surface water bodies are addressed in the Regional Recommendations section of the LWC Planning Document and include the Big Cypress Basin canal system and the Caloosahatchee River. The planning document recommends that the District identify opportunities to cooperatively evaluate the feasibility of using the Caloosahatchee River as a seasonal source of supply; and implementation of long-term modifications of the Big Cypress Basin canal system in Collier County. Other regional recommendations in the planning document include assisting Lee County in adopting the Lee County Surface Water Management Plan, which recommends increasing water supply within the county's basins; and working with public water suppliers and local governments in identifying additional sites for ASR projects.

North Coastal Basin

The North Coastal Basin is in southeastern Charlotte County and northwestern Lee County. There are numerous creeks within this basin. The basin drains via overland flow from the C.M. Webb Wildlife Management Area in Charlotte County into the Gator Slough watershed within northwestern Lee County. Most of this basin drains through the Gator Slough Canal into Cape Coral's canal system. This basin could provide a source of water supply for direct use or recharge (Johnson Engineering *et al.*, 1990).

Tidal Caloosahatchee Basin

The Tidal Caloosahatchee Basin extends on both sides of the saltwater portion of the Caloosahatchee Basin, northerly into Charlotte County. Numerous creeks drain into the Caloosahatchee River in this basin. These creeks are tidally influenced and are not suitable as a major source of surface water withdrawal. The Lee County Interim Surface Water Management Plan (Johnson Engineering *et al.*, 1990) recommends putting weirs in several of the creeks to maintain water levels in the dry season. The report suggests that Trout Creek and the channelized portion of the Orange River have a potential for water supply. Trout Creek receives drainage from the C. M. Webb area via sheetflow and a large canal; placing a weir in the creek would enhance its water supply potential. In the Lehigh Acres area, the weirs in Able Canal (the channelized portion of the Orange River) provide recharge to the area. If it were feasible to connect the weir system, a water treatment facility injection retrieval system could be developed. The LWC Planning Document recommends looking into opportunities to cooperatively evaluate the feasibility of using the Caloosahatchee River as a seasonal source of supply.

Telegraph Swamp Basin

The Telegraph Swamp Basin extends from Charlotte County southward to the Caloosahatchee River. The major feature of this basin is the Telegraph Cypress Swamp which drains via sheetflow into Telegraph Creek in Lee County. Since this is a large watershed (approximately 92 square miles) with sheetflow discharge, there is a potential for this basin to be a good recharge area (Johnson Engineering *et al.*, 1990).

Lower West Coast Background Document

West and East Caloosahatchee, C-21, and S-236 Basins

The West and East Caloosahatchee, C-21, and S-236 basins extend along the freshwater portion of the Caloosahatchee River (C-43 Canal), from S-79 (Franklin Lock and Dam) to S-77 at Lake Okeechobee. The basins include parts of Lee, Collier, Hendry, Glades, and Charlotte counties. The C-43 Canal is the major surface water resource within these basins. In 1990, 24.4 percent (or 9.56 MGD) of the total public water supply for Lee County came from the Caloosahatchee River.

Although the C-43 is already allocated, it may be able to yield additional amounts of water during the wet season for aquifer storage and recovery (ASR), a technique which stores excess water by injecting it into an aquifer, where it can later be recovered when needed. However, there is significant institutional and technical uncertainty regarding the feasibility of untreated surface water ASR from a water quality and permitting standpoint. The LWC Planning Document recommends that the District work with public water suppliers and local government in identifying additional sites for ASR projects, and with the FDEP to address ASR in Florida laws.

The C-43 Canal provides drainage for numerous private drainage systems and local drainage districts within the combined drainage basins. The canal also provides irrigation water for agricultural projects within the basins and public water supply for the City of Fort Myers and part of Lee County. A primary purpose for the canal is to provide relief for regulatory releases of excess water from Lake Okeechobee. In the East Caloosahatchee Basin, Lake Hicpochee was severely impacted by the construction of the C-43 Canal. The canal was constructed through the lake's center, which resulted in lower lake water levels.

There are three structures (S-77, S-78 and S-79) which provide for navigation and water control in the C-43 Canal. These structures serve to control the water stages in C-43 from Lake Okeechobee (S-77) to Franklin Lock (S-79). Water levels upstream of S-78 are maintained at approximately 11 feet national geodetic vertical datum (NGVD), and 3 feet NGVD downstream. The S-79 structure also serves as a saltwater barrier. The operation schedule for these structures is dependent on rainfall conditions, agricultural practices, the need for regulatory releases from Lake Okeechobee, and the need to provide water quality control for the public water supply facilities (SFWMD, 1987).

Estero Bay Basin

In the Estero Bay Basin in southern Lee County, there is a two-fold water management problem. Overdrainage is a problem in areas that lack control structures that could increase water levels in the canal system. Conversely, lack of conveyance in other areas result in flooding. The basin includes Hendry Creek, Mullock Creek, Ten Mile Canal, Kehl Canal, Estero River, and the Imperial River. These waterways, with the exception of Ten Mile Canal and Kehl Canal, are all tidally influenced to some degree.

Several waterwork projects have been completed, or are underway, to increase water levels in the western part of the basin and to protect the water resources against saltwater intrusion. Hendry Creek has a saltwater barrier, while in Ten Mile Canal, weirs have been raised to increase the water levels within Six Mile Cypress Slough. Johnson Engineering (1990) concluded that the Estero Bay Basin does not have a major source of surface water available for water supply. However, because the basin has good recharge areas, saltwater barriers (weirs), could be used

Lower West Coast Background Document

to increase water levels within the basin for recharge. An additional measure to help maintain water levels during the dry season could be the application of ASR technology. The Lee County Regional Water Supply Authority is planning a treated-water ASR pilot project at the Lee County Corkscrew Water Treatment Plant, which is expected to be completed in late 1996.

The Estero River east of U.S. 41 has slow conveyance and is considered a good recharge area, as is the Imperial River east of I-75. The Kehl Canal is connected to this river and drains the water levels within this basin in the dry season. The District and Lee County cost-shared the construction of the weir on the Kehl Canal. This weir serves as a saltwater barrier and increases water levels in the canal during the dry season.

In the eastern part of the basin, where flooding is a chronic problem, Lee County is planning conveyance structures to help alleviate flooding. However, further study is recommended to provide alternatives to address flooding and future development within the eastern basin.

West Collier Basin

The West Collier Basin extends from State Road 29 westward to the Gulf of Mexico and northward to the Lee County border, and includes part of Glades County. The basin does not have a major source of surface water for year-round water supply. Lake Trafford, in the northern section of the basin, has a drainage area of approximately 30 square miles. The lake is relatively small (2.3 square miles) and is not considered an important source of water storage for the region. The Gordon and Cocohatchee rivers are the two major rivers in this basin. Both of these rivers are tidally influenced and connect to the extensive canal system within this basin. This canal system, operated and managed by the Big Cypress Basin Board, serves primarily as a drainage network. Control elevations in these canals are being revised by the Big Cypress Basin Board in accordance with their five-year plan to raise the water levels and prevent overdrainage of the basin. Since the primary source of water for this system is rainfall, the canals have little or no flow during the dry season. In addition, three salinity control structures are planned for the Cocohatchee Canal system to help preserve water resources (one structure is being contracted to be built, one has been permitted, and one is still in the design stage).

Two projects using aquifer storage and recovery (ASR) technology are scheduled for Collier County. One project, managed by the Collier County Utilities Division, has been constructed, but the evaluation is still ongoing. The project is near the intersection of U.S. 41 and S.R. 951 and will be used to provide potable water. The second ASR project, is in the planning stage and involves a cooperative effort between the Big Cypress Basin Board and the Collier County Utilities Division. The ASR system will inject canal water from the I-75 canal and the Golden Gate main canal during the rainy season, and recover the water during the dry season. The recovered water will be used for irrigation purposes on large residential developments in the Livingston Road area of Collier County.

The West Collier Basin has extensive wetland systems. These systems include the Corkscrew Regional Ecosystem Watershed (CREW), Fakahatchee Strand State Preserve, and the Collier-Seminole State Park (Figure III-1). An assessment of the CREW area was completed in September 1993. The assessment indicated that wellfield development and/or aquifer augmentation could affect the wetlands within

Lower West Coast Background Document

the CREW boundaries. The assessment recommends detailed three-dimensional analyses prior to any proposed wellfield development.

East Collier Basin

The East Collier Basin extends from State Road 29 eastward to the LWC Planning Area boundary, and northward approximately three miles into southern Hendry County. The Big Cypress National Preserve forms most of this basin (Figure III-1). There are no major rivers or major sources of surface water for year-round water supply use in this basin.

Drainage Districts

Chapter 298, Florida Statutes governs local drainage districts. These 298 districts (Figure II-1) are empowered to develop and implement a plan for draining and reclaiming the lands within their jurisdiction. The 298 districts have the power to construct and maintain canals, divert flow of water, construct and connect works to canals or natural watercourses, and construct pumping stations. They may also enter into contracts, adopt rules, collect fees, and hold, control, acquire or condemn land and easements for the purpose of construction and maintenance.

The SFWMD's past practice has been to issue consumptive use permits to the 298 districts for surface water use, while not requiring individual permits for users within these districts. Some 298 districts, however, may not have received a consumptive use permit; in these cases individual permits would be issued. The individual 298 district must still meet all conditions for issuance of a permit. The permit should indicate how water will be allocated, and should list the type and quantity of water use for each user.

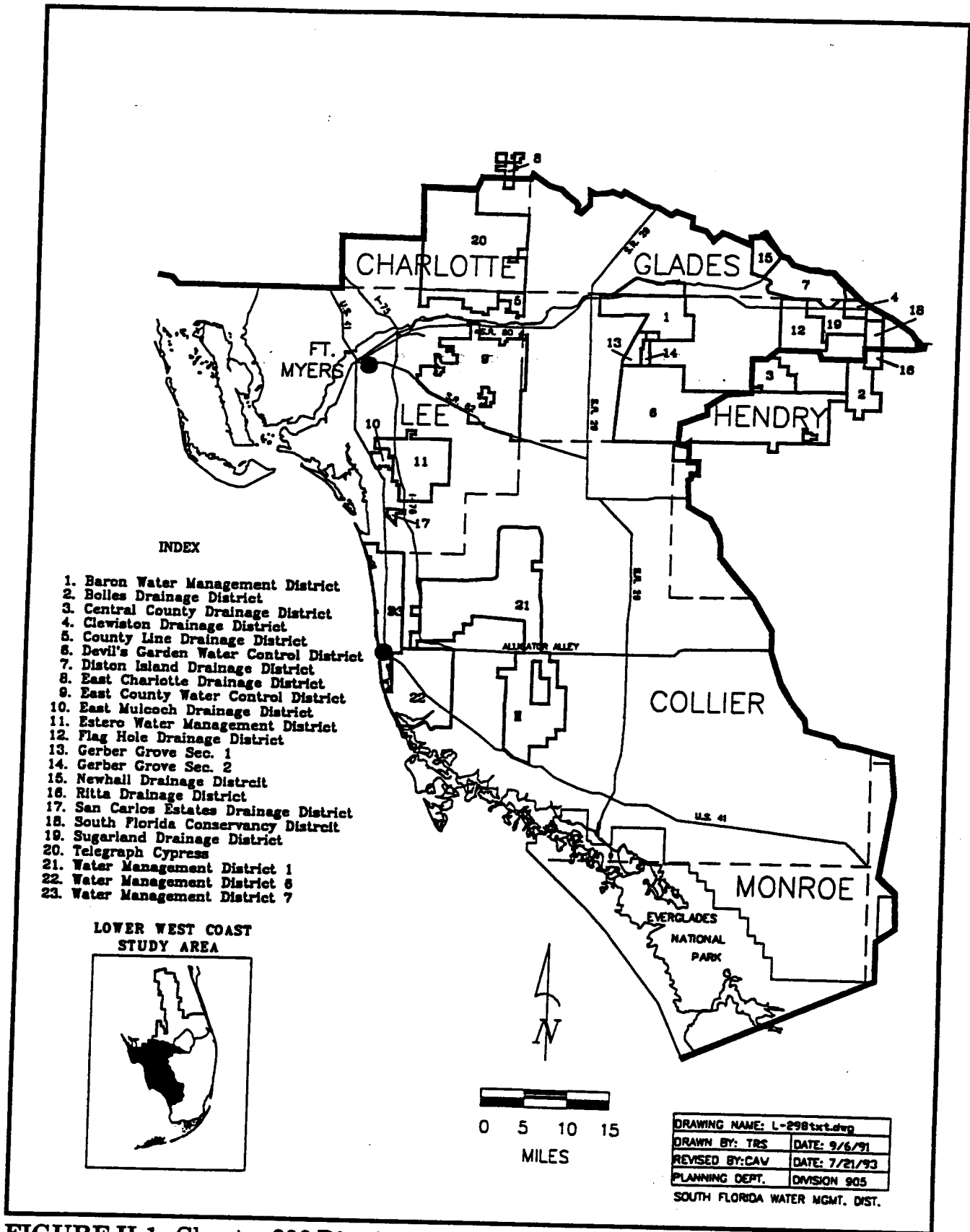


FIGURE II-1. Chapter 298 Districts.

GROUND WATER RESOURCES

Hydrogeologic formations are defined by their ability to store and transmit water. Those capable of yielding significant quantities of water are termed aquifers. Those which do not yield significant quantities of water, and impede or restrict ground water movement to or from an aquifer are called aquitards. When an aquitard overlies or underlies an aquifer it is labeled a confining zone.

The hydrogeology of South Florida is diverse. It includes aquifers which are confined (in which ground water is under greater than atmospheric pressure and isolated from vertical recharge), semi-confined (having some vertical recharge), and unconfined (ground water is at atmospheric pressure and water levels correspond to the water table). Within an individual aquifer, hydraulic properties and water quality may vary both vertically and horizontally. Because of this diversity, ground water supply potential varies greatly from one place to another. It is the purpose of this section to identify the aquifers in the region, and describe their current usage and water producing capability.

Three major aquifer systems have been recognized within the LWC Planning Area: the Floridan Aquifer System (FAS), Intermediate Aquifer System (IAS), and Surficial Aquifer System (SAS). These aquifer systems are summarized for the three counties modeled for this plan (Collier, Hendry and Lee) in tables II-1 through II-3. The ground water flow models used to evaluate hydrogeologic systems and identify problem areas are discussed in the planning document. A more detailed table (D-1) showing the temporal and physical relationships between these different aquifer systems, along with corresponding figures (D-1 to D-4), is located in Appendix D. Maps showing the elevation and thickness of each of the hydrogeologic units (figures D-5 to D-15) are also provided in the appendix. In addition, information on ambient groundwater quality, contamination sites, and saltwater intrusion is provided in Appendix H.

Although portions of Charlotte, Glades, and Monroe counties are within the planning area, they are not included in the ground water analysis. The Charlotte County Area has no significant urban water demands, and the agricultural water demand accounts for less than two percent of the total demand in the planning area. There are two major wetlands systems in the Charlotte County Area, one of them preserved for environmental protection, and the other proposed for public acquisition. In the Glades County Area, most of the land use is agricultural, with agricultural water demand accounting for over eight percent of the total demand in the planning area. Presently, there is not enough data on the hydrogeology of Glades County to develop a ground water model for the LWC Water Supply Plan, but a ground water reconnaissance study is underway and is anticipated for completion in 1996. There are no urban or agricultural demands in the Monroe County Area, as it is wholly protected as part of the Everglades National Park.

Floridan Aquifer System

The FAS, which underlies all of Florida and portions of southern Georgia and Alabama, contains several distinct producing zones which are described by Wedderburn *et al.*, 1982. Although it is the principal source of water in Central Florida, the FAS yields only nonpotable water throughout most of the LWC Planning Area. The quality of water in the FAS deteriorates southward, increasing in hardness and salinity. Salinity also increases with depth, making the deeper producing zones less suitable for development than those near the top of the system.

Lower West Coast Background Document

TABLE II-1. Ground Water Systems in Collier County.

Hydrogeologic System	Hydrogeologic Unit	Thickness (feet)	Water Resource Potential
Surficial Aquifer System	Water Table Aquifer	20-100	Most productive aquifers in the county. Yield high quality water, except for isolated areas with high iron content. Potential for saltwater intrusion in coastal areas.
	Lower Tamiami Aquifer	40-180	
Intermediate Aquifer System	Sandstone Aquifer	0-110	Yields large amounts of water in the northern portion of the county, but is absent south of Alligator Alley. Suitable for mostly agricultural uses.
	Mid-Hawthorn Aquifer	60-120	Aquifer is low yielding and produces poor quality water. Suitable only for micro irrigation uses.
Floridan Aquifer System	Lower Hawthorn/Suwanee Aquifer	Insufficient Data	Capable of high yields, but require desalination treatment. Some zones may be suitable for use in aquifer storage and recovery.

TABLE II-2. Ground Water Systems in Hendry County.

Hydrogeologic System	Hydrogeologic Unit	Thickness (feet)	Water Resource Potential
Surficial Aquifer System	Water Table Aquifer	3-99	Extensive throughout Hendry County. Productivity varies widely. Heavily used in isolated areas where other aquifers do not exist, or are low yielding.
	Lower Tamiami Aquifer	0-135	Most productive aquifer in Hendry County. Heavily used in the southeast county area. Thin or nonexistent in the northern and western portions of the county.
Intermediate Aquifer System	Sandstone Aquifer	0-120	Occurs in western Hendry County. Heavily used in areas where the lower Tamiami is thin or nonexistent. Moderately productive; water nonpotable in many areas.
	Mid-Hawthorn Aquifer	No Data	Limited occurrence in Hendry County. Very low productivity; water quality not suitable for most irrigation uses.
Floridan Aquifer System	Lower Hawthorn/Suwanee Aquifer	No Data	Little is known about the Floridan in Hendry County. It is believed to be capable of producing large volumes of water through flowing wells. Water is not suitable for irrigation.

Lower West Coast Background Document

TABLE II-3. Ground Water Systems in Lee County.

Hydrogeologic System	Hydrogeologic Unit	Thickness (feet)	Water Resource Potential
Surficial Aquifer System	Water Table Aquifer	20-80	Yields moderate amounts of high quality water, but already heavily allocated. Susceptible to saltwater intrusion near the coast
	Lower Tamiami Aquifer	0-140	Absent from northern Lee County. Where present, yields moderate-to-large amounts of high quality water. Susceptible to saltwater intrusion near the coast.
Intermediate Aquifer System	Sandstone Aquifer	0-110	Yields large quantities of good quality water in south central Lee County, but is absent in the north and east.
	Mid-Hawthorn Aquifer	40-120	Yields small quantities of good quality water in Cape Coral and north of C-43. Elsewhere suitable only for micro irrigation uses.
Floridan Aquifer System	Lower Hawthorn/Suwanee Aquifer	Insufficient Data	Capable of high yields, but requires desalination treatment. Some zones may be suitable for use in aquifer storage and recovery.

Despite the lack of potable water, developments in desalination technology have made treatment of water from the upper portion of the FAS feasible where chloride concentrations are not prohibitively high. The most productive zones are the lower Hawthorn and Suwannee aquifers. Because water from these aquifers requires expensive desalination treatment for potable uses, the lower Hawthorn and Suwannee aquifers have not been extensively developed for water supply in the planning area. Currently, only four utilities, the City of Cape Coral, Greater Pine Island, Marco Island Utilities, and Sanibel Island Water Association, obtain water from the lower Hawthorn or Suwannee aquifers. Elsewhere, the aquifers supply only a few agricultural irrigation wells. Improvements in desalination treatment technology will make development of these aquifers increasingly feasible; continuing development in the LWC Planning Area, moreover, will make it necessary. Portions of the producing zones may also have potential for use in ASR projects.

In the deeper producing zones of the FAS, there are areas of extremely high transmissivity, known as "boulder zones." Although they are not used as supply sources within the planning area due to the high salinity and mineral content, these formations may serve other purposes. In some areas the boulder zones have been used as disposal areas for treated wastewater effluent or residual brines from the desalination process.

Intermediate Aquifer System

The IAS consists of five zones of alternating confining and producing units which are further described in other District Publications (Wedderburn *et al.*, 1982; Smith and Adams, 1988; and Knapp *et al.*, 1984. The producing zones which comprise the IAS include the mid-Hawthorn and Sandstone aquifers.

Lower West Coast Background Document

Although present throughout the LWC Planning Area, the mid-Hawthorn Aquifer is not always productive. Its thickness is variable and relatively thin (it rarely exceeds 80 feet). This variability, combined with the presence of interbedded low permeability layers, results in low productivity of the aquifer. In addition to low productivity, the aquifer experiences a degradation in water quality as it dips to the south and east, yielding only saline water in much of the planning area.

The mid-Hawthorn aquifer formerly provided water for the City of Cape Coral and the Greater Pine Island water utility. However, its limited water-producing characteristics made it an unreliable source. Both utilities have been forced to develop other sources, using the mid-Hawthorn wells for backup supply only. Today, the greatest use of the mid-Hawthorn is for domestic irrigation in Cape Coral and the area southwest of Fort Myers. It is also used for domestic self supply in those areas of Cape Coral not served by city water and for small water utilities north of the Caloosahatchee River. Elsewhere the aquifer is used only occasionally for agricultural irrigation.

The Sandstone aquifer, like the mid-Hawthorn, has variable thickness. It averages over 100 feet near Immokalee and portions of central Lee County, but pinches out to the south around Alligator Alley, to the northwest in part of Cape Coral, and to the east in the middle of Hendry County.

The productivity of the Sandstone aquifer is highly variable. It provides all of the water withdrawn by the Lehigh Acres public water supply wellfield and a portion of that withdrawn by the Lee County Corkscrew and Florida Cities Green Meadows wellfields. In western Hendry County, where the lower Tamiami aquifer is absent, it is an important source of water for agricultural irrigation, but is not capable of supporting large-scale agricultural operations in most areas. Only marginally acceptable for potable uses in Hendry and Collier counties, water from the Sandstone aquifer is suitable for irrigation purposes throughout its extent, with the exception of the La Belle area, where it has been contaminated by flowing Floridan wells.

Surficial Aquifer System

The SAS may be divided into two aquifers, the water table and lower Tamiami, which are separated by leaky confining beds over much of the area. The thickness of the SAS ranges from more than 200 feet in central and southern Collier to four feet southwest of La Belle in Hendry County. The SAS is further described by Bower *et al.*, 1990, Smith and Adams, 1988; and Knapp *et al.*, 1986.

The water table aquifer includes all sediments from land surface to the top of the Tamiami confining beds. Within Lee County, four major public water suppliers, all located in areas where the confining beds are absent, pump water from the water table aquifer. These are Lee County Utilities (Corkscrew wellfield), Gulf Utilities, Florida Cities (Green Meadows wellfield), and the City of Fort Myers. The aquifer also furnishes irrigation water for many uses, including truck crops, nurseries, and landscape irrigation. In Hendry County, the water table aquifer is generally used only where no suitable alternative is available, though it may yield copious quantities of water in isolated areas. It produces good quality water, except in areas with high concentrations of chlorides and dissolved solids near La Belle and parts of the coast, and isolated areas with high iron concentrations.

Lower West Coast Background Document

The lower Tamiami is the most prolific aquifer in Hendry and Collier counties. The lower Tamiami aquifer supplies water to Bonita Springs, City of Naples, Immokalee, and North Naples, as well as many domestic self suppliers and landscape and agricultural irrigation wells. Because of the large demands on the aquifer, it has been endangered by saltwater intrusion on the coast, and is frequently included in water shortage declarations.

CONSUMPTIVE USE PERMITTING

All water uses within the District require authorization from the District via a permit except water used in a single family dwelling or duplex, and provided that the water is obtained from one well for each single family dwelling or duplex, and is used either for domestic purposes or outdoor uses. Water used for fire fighting and the use of reclaimed water is also exempt from permitting. A water use permit will be granted as long as the applicant provides justification that the proposed water use is consistent with the public interest, is a reasonable-beneficial use of water, and one that will not interfere with any existing legal use of water.

The District issues permits for water withdrawals via the Consumptive Use Permitting (CUP) Program. The "Management of Water Use Permitting Information Manual Volume III" (1993), commonly referred to as the Water Use Basis of Review or BOR, is the document that identifies the procedures and information used by District staff in permit application review. The District issues water use permits in two forms, individual water use permits and general water use permits. An individual water use permit is issued for projects whose average day water use exceeds 100,000 gallons per day (GPD) while general permits are issued when the use does not exceed 100,000 GPD, except in areas designated as reduced threshold areas (RTAs). The duration of a general permit is 20 years, while an individual permit is based on the applicant's demonstrated ability to meet demand. This generally does not exceed ten years for public water supply and industrial uses, and three years for dewatering; duration for irrigation permits, except golf, is normally established by basin expiration dates. Golf uses are not to exceed the lesser of the basin expiration date or three years. In Lee County, water use permits are not to exceed five years.

As a result of existing and potential water supply problems, four types of specially designated areas have been established by the District, as described below. Three of these designations (reduced threshold areas, areas of special concern, and critical water supply problem areas) occur within the LWC Planning Area, as shown in Figure II-2. The fourth designation, restricted allocation areas, is provided in the text for the reader's information.

Reduced Threshold Areas

The volume of usage which distinguishes a general permit from an individual permit is referred to as the permit threshold. In resource depleted areas where there has been an established history of substandard water quality, saline water movement into ground water and surface water bodies or the lack of water availability to meet projected needs of a region, the District has reduced this threshold to 10,000 GPD average daily use. These areas are referred to as reduced threshold areas (RTAs) and include: Lee County, Coastal Collier County, Southwestern Glades County, and Northwestern Hendry County.

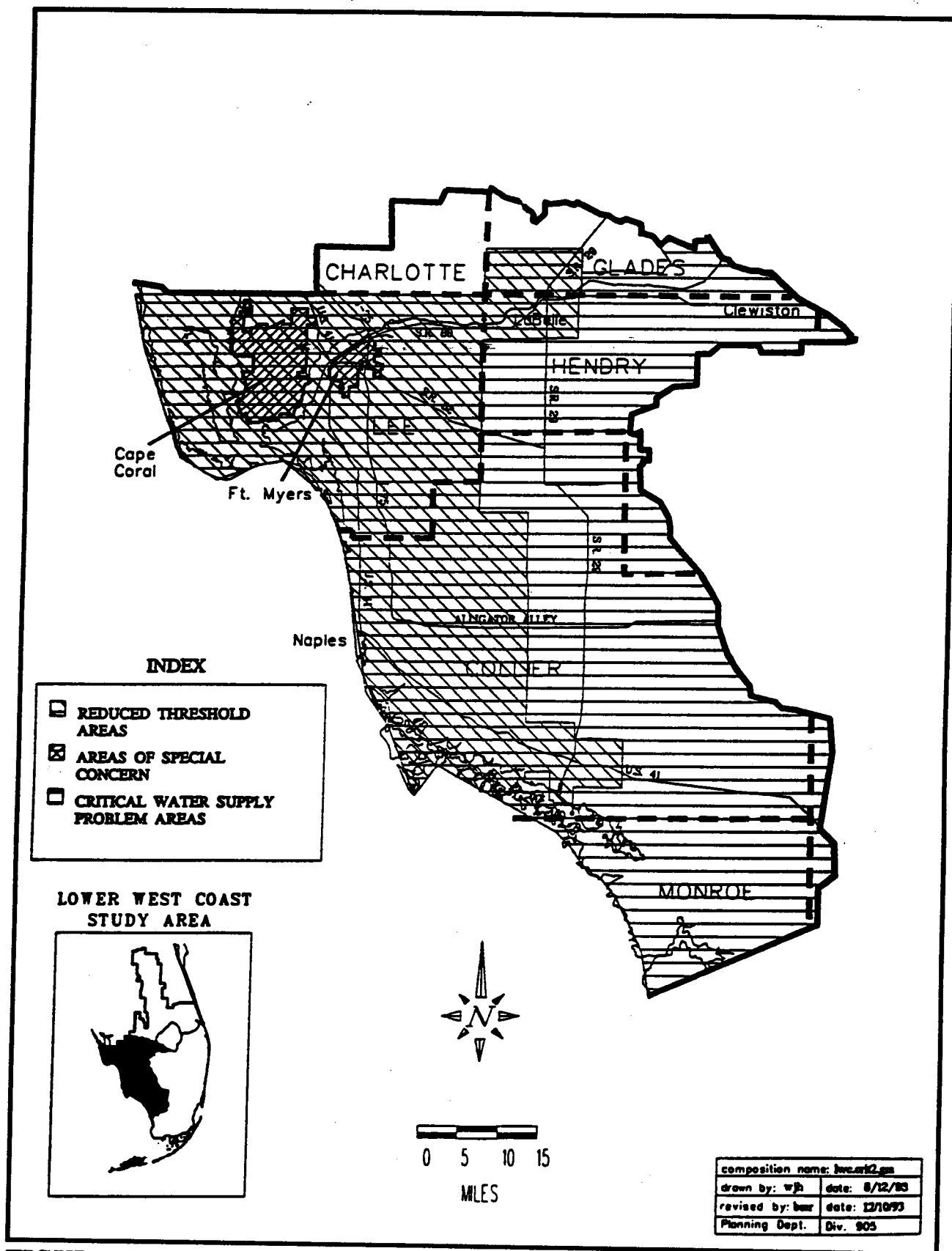


FIGURE II-2. Specially Designated Areas within the LWC Planning Area.

Lower West Coast Background Document

Areas of Special Concern

An area is of special concern because either there are limitations on water availability or there are other potentially adverse impacts associated with a proposed withdrawal. These areas are determined by the District on a case-by-case basis. The designated areas of special concern in the LWC Planning Area are the potable water service areas for the cities of Fort Myers and Cape Coral.

Critical Water Supply Problem Areas

Critical water supply problem areas are those areas that have experienced or are anticipated to have water supply problems within the next 20 years. Most of the LWC Planning Area is designated as a Critical Water Supply Problem Area. District rules specify that these areas must make use of a reclaimed water source unless the applicant demonstrates that its use is either not economically, environmentally or technologically feasible.

Restricted Allocation Areas

Restricted Allocation Areas (RAAs) are areas designated within the District for which allocation restrictions are applied with regard to the use of specific sources of water. The water resources in these areas are managed in response to specific sources of water for which there is a lack of water availability to meet the needs of the region from that specific source of water. There are no RAAs within the LWC Planning Area; however, this designation exists in the other three planning areas.

WATER TREATMENT

Potable Water Facilities

Potable water in the LWC Planning Area is supplied by three main sources: (1) regional municipal or privately owned water treatment facilities, (2) smaller developer/homeowner association or utility owned water treatment facilities, and (3) self-supplied individual wells that serve individual residences. Many of the smaller facilities are constructed as interim facilities until regional potable water becomes available. At that time, the smaller water treatment facility is abandoned upon connection to the regional water system.

There are 29 regional water treatment facilities in 21 service areas within the LWC Planning Area. These facilities, which serve about 80 percent of the planning area population, have capacities of 0.50 MGD or greater. The utility service areas are shown in Figure II-3. Most of these facilities use raw water from ground water, rather than surface water, sources. Twenty-six of the facilities use ground water, while five use surface water for all or a portion of their raw water sources. Due to regulatory constraints, as well as the quantity and quality of available surface waters, most of the utilities are considering ground water sources to meet future demands. The locations of the wellfields for these facilities are shown in Figure II-4. Detailed maps showing the location of each treatment facility and associated wellfield(s) are provided in Appendix E. Other detailed information provided in the appendix includes the source aquifer and pump capacity for each of the wells; existing, proposed, and future sources of raw water; and water treatment methods for each facility. Water demand estimates for all potable water treatment facilities, including those with capacities less than 0.50 MGD are discussed in Appendix G.

Lower West Coast Background Document

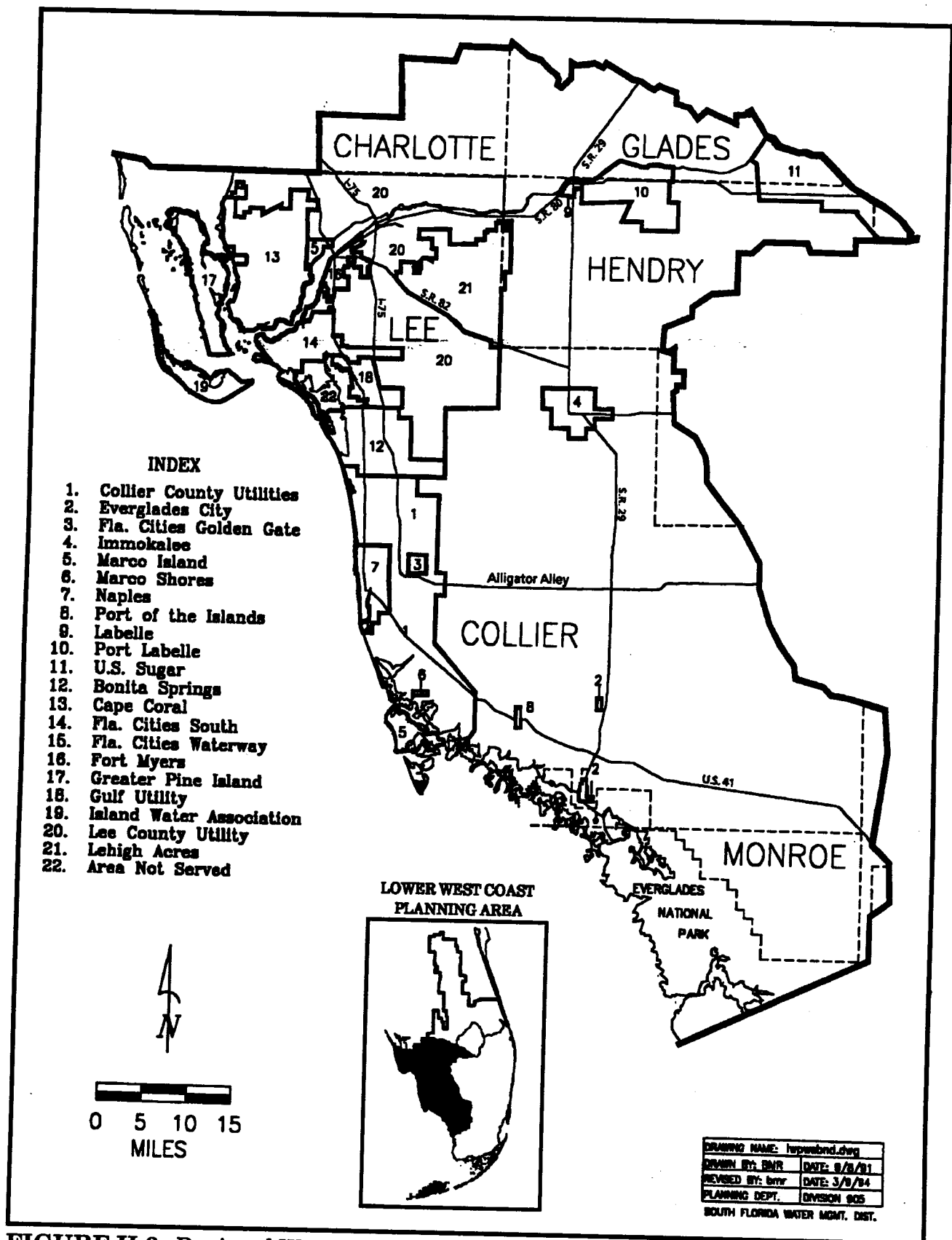


FIGURE II-3. Regional Water Utility Service Areas.

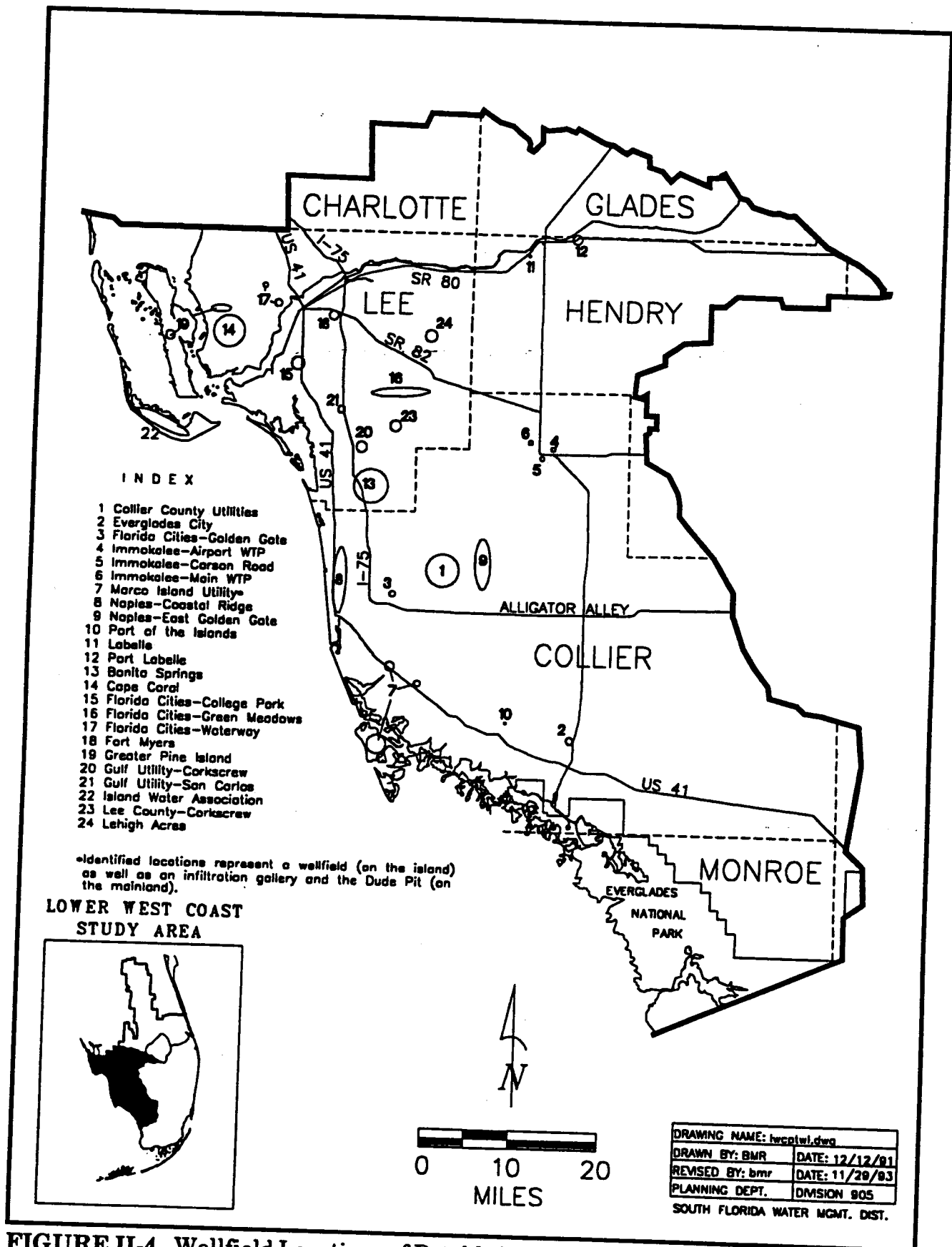


FIGURE II-4. Wellfield Locations of Potable Water Treatment Facilities.

Lower West Coast Background Document

The existing treatment technologies employed by the facilities are lime softening, reverse osmosis, and electrodialysis. Of the 29 facilities, 21 (72 percent) use lime softening exclusively, five (17 percent) use membrane technology and/or electrodialysis, and three (10 percent) uses a combination of reverse osmosis and lime softening. Generally, lime softening is used in all areas, except on barrier islands and areas where saltwater intrusion has occurred. More stringent future drinking water standards (see Chapter V), combined with deteriorating water quality and decreasing freshwater supplies, necessitates that greater emphasis be placed on nonconventional methods of treatment (e.g., membrane technologies) and alternative raw water sources (e.g., brackish/saline water).

All public water systems in the LWC Planning Area are regulated by the Florida Department of Environmental Protection (FDEP), with the following exceptions: (1) those water systems that have less than 15 service connections, or (2) facilities which regularly serve less than 25 individuals daily at least 60 days out of the year, or (3) facilities which serve at least 25 individuals daily less than 60 days out of the year, or (4) facilities located in Lee County, where the FDEP has delegated the responsibility of all public water systems to the Lee County Health Department. All other similar systems in the remaining counties are regulated by the local health departments (Chapter 17-550, F.A.C.).

Wastewater Treatment Facilities

Wastewater treatment in the LWC Planning Area is provided by regional municipal or privately owned wastewater treatment facilities, smaller developer/homeowner associations or utility owned wastewater treatment facilities, and septic tanks. There are approximately 350 wastewater treatment facilities permitted by the FDER with approved capacities between 0.0035 and 12 MGD in the planning area. Of these, 21 facilities have a capacity of 0.50 MGD or greater. This discussion focuses on these 21 facilities because they have sufficient flows that could have a positive impact on the water resource through reuse. The smaller facilities (<0.50 MGD) tend to be constructed as interim facilities until regional wastewater treatment becomes available, at which time the smaller wastewater treatment facility is abandoned upon connection to the regional wastewater system. The utility service areas for the regional systems are shown in Figure II-5. In 1990, these regional facilities treated 41.76 MGD of wastewater.

All the regional facilities use the activated sludge treatment process. The methods of reclaimed water/effluent disposal include surface water discharge, reuse, and deep well injection. Seven facilities use surface water discharge to the Caloosahatchee River, sixteen utilize reuse, and one uses deep well injection. For three of these facilities, the surface water discharge and deep well injection serve as a backup disposal method to their reuse system. Figure II-6 shows the 1990 utilization of each of these disposal methods. Uses of reclaimed water include irrigation of golf courses, residential lawns, and other green spaces; irrigation of hay fields; and ground water recharge by percolation ponds.

Specific information on each of these 21 regional facilities, as well as 2 future facilities, can be found in Appendix E. The information includes existing facility descriptions, as well as the proposed and future plans of the utilities.

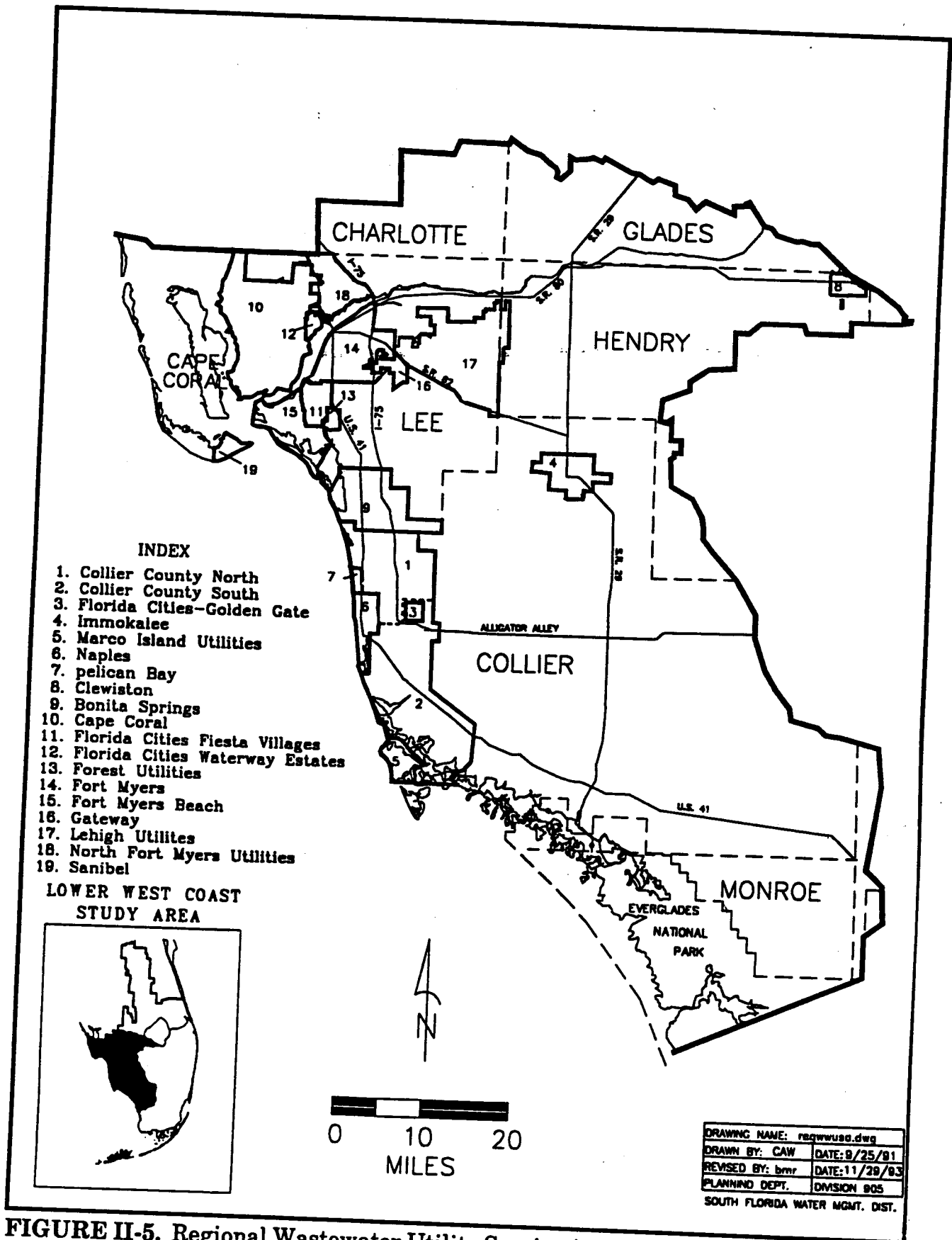


FIGURE II-5. Regional Wastewater Utility Service Areas.

Lower West Coast Background Document

Wastewater treatment in the LWC Planning Area is regulated by the FDEP for all facilities, with the following exceptions: (1) those with a design capacity of 2,000 GPD or less which serve the complete wastewater and disposal needs of a single establishment, or (2) septic tank drainfield systems and other on-site sewage systems with subsurface disposal and a design capacity of 5,000 GPD (3,000 GPD for restaurants) or less, which serve the complete wastewater disposal needs of a single establishment. All other systems are regulated by the local health department for each county (Chapter 17-600, F.A.C.).

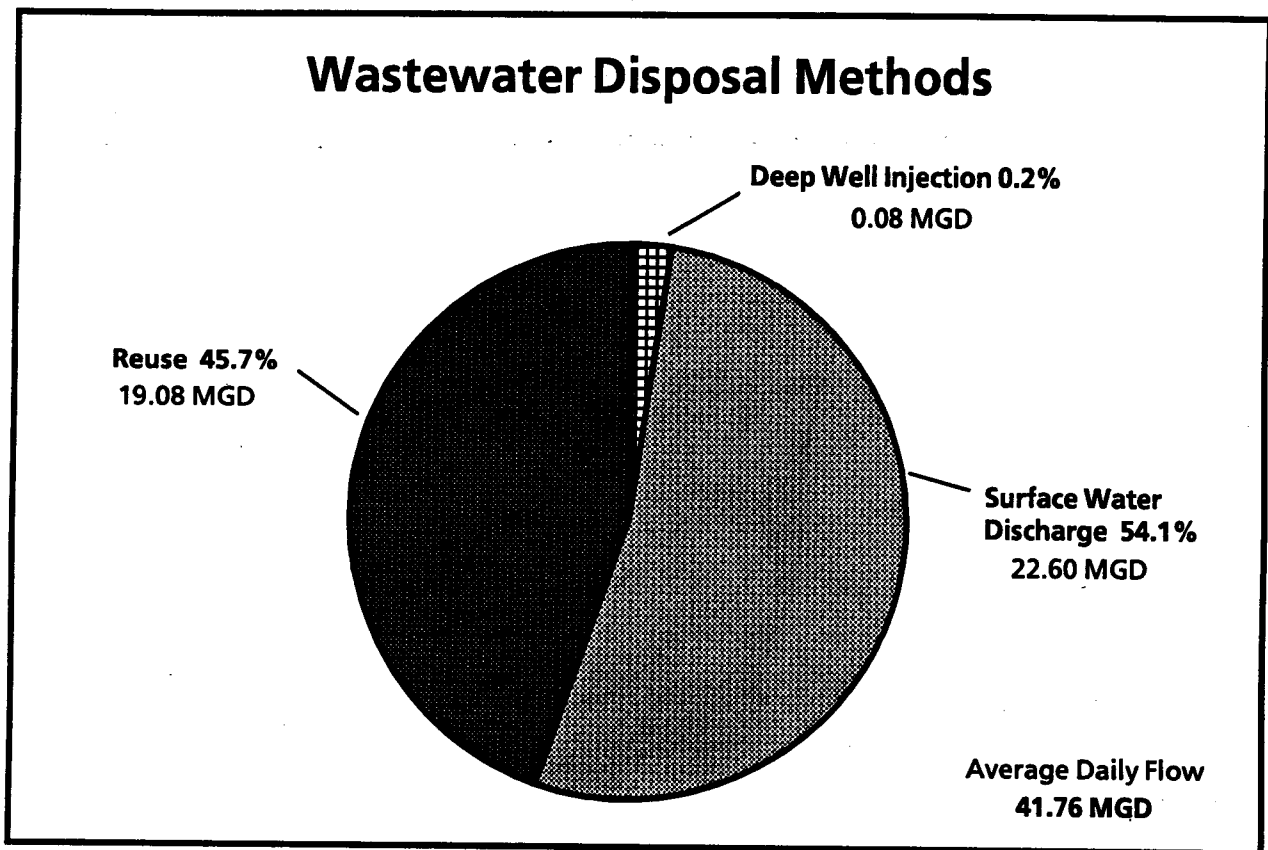


FIGURE II-6. LWC Planning Area Wastewater Disposal Methods for 1990.